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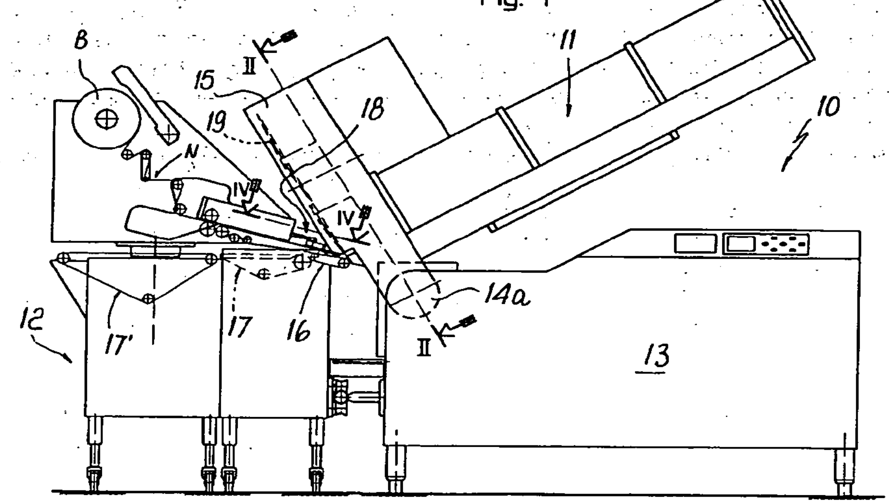
(54) Improved industrial slicer, particularly for food products

(57) The slicer comprises a cutting unit (15) with a rotating blade (19) that is eccentrically supported by a flywheel support, interleaving means (18) for inserting sheets between one slice and the next, and portion-making means (16-17) for the programmed formation of the groups of slices. The cutting unit (15) comprises two independent motors, respectively connected to the flywheel support with a single transmission and to the rotating blade (19) with a double transmission; the interleaving means (18) comprise two insertion guides that protrude into the slice release regions of the cutting unit (15) to support individual sheets at the falling path of the slices, and the portion-making means are constituted by two belts (16-17) arranged one after the other, the second belt (17) being actuated so as to constitute an extension of the first belt.

Fig. 1



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Description

The present invention relates to an improved industrial slicer, particularly for food products, and more precisely to a slicer provided with a rotating blade which moves along an orbital pass path, biting into the product to be sliced, which is supported by a carriage that advances at right angles to the blade in steps the length whereof corresponds to the thickness of each slice of product.

In conventional industrial slicers of the above type, the rotating blade is supported eccentrically by a support formed by a rotating disk, a so-called flywheel, and revolves around the axis of the disk, moving along said pass path.

There are accordingly two different rotation speeds: the cutting speed, which corresponds to the angular velocity of the blade about its own axis, and the pass speed, which corresponds to the angular velocity of the flywheel support about its own axis. These speeds, which are distinctly different and between which typically the former speed is much greater than the latter, depend on the characteristics and temperature of the product to be sliced.

In some conventional industrial mechanical slicers, the rotation rate of the blade is correlated to that of the flywheel according to a fixed ratio that is provided by means of a mechanical transmission interposed between said flywheel and said blade; the blade is actuated by means of said transmission by the flywheel which, by virtue of the fixed arrangement of its rotation axis, is capable of receiving motion from a motor lying outside the flywheel-blade system, for example by means of a transmission with a toothed belt or the like.

The constant ratio between the cutting speed and the pass speed is however a severe drawback, since this ratio, too, depends significantly on the characteristics and temperature of the product to be sliced. In other words, a correct slicing process requires the possibility to vary, independently and within rather wide limits, the cutting and pass speeds, adapting them to the different characteristics and to the temperature of the products being treated, as well as to the thickness of the slices to be produced.

In general, an excessively low ratio between the cutting and pass speeds generates the so-called "shear" effect, making it difficult to produce thin slices, whereas an excessively high ratio entails the risk of singeing the product being treated, due to the excessive sliding of the cutting blade on the product itself. Typically, the values of said ratio are between 1:4 and 1:12. The lowest values are used to treat products stored at low temperature, the higher values are used for products at a higher temperature, for example ambient temperature.

In view of the above requirements of the slicing process, other more recent known slicers, incorrectly termed "electronic" slicers, allow to vary the ratio between the pass speed and the cutting speed, but with systems that are scarcely satisfactory essentially because of their considerable structural complexity and because of the presence of servo-controls of the drive motor or motors, which makes these systems economically disadvantageous and scarcely adapted for automatically programming said ratio according to the different operating requirements.

An important object of the present invention is to provide an industrial slicer of the specified type that is adapted to allow, in a simple and economically advantageous manner, the independent variation of the cutting and pass speeds, allowing to program said speeds individually within wide limits to optimize the value of the ratio between said speeds, which is required by the slicing process for each individual product, correspondingly optimizing said process both in terms of waste reduction and in terms of yield of product sliced in the unit time.

In industrial slicers of the above specified type interleaving devices are also provided, i.e., means that are adapted to insert sheets of packaging material between one slice and the next to prevent the slices from joining again once they have been stacked and packaged.

In conventional slicers, these interleaving means, too, do not perform their function satisfactorily, substantially due to their considerable structural complexity, which limits their operating speed, slowing down the entire slicing process, and due to the inaccuracy in laying the sheet, which often arrives too late with respect to the slice released by the cutting system, with the consequence that the separator sheet is only partially or in any case incorrectly interposed between two overlapping slices.

Another important object of the present invention is to provide a slicer that obviates this drawback with improved interleaving means that are capable of ensuring the correct insertion of the separator sheet between one slice and the next as well as perfect synchronization in feeding said sheet with respect to the rate at which the slices are released by the cutting system, and that are also capable of suspending, if required, the interposition of the separator sheet under the first slice of each stack.

Another object of the invention is also to improve the so-called portion-making system of the machine, i.e., the system that receives the cut slices and groups them in portions having a given composition and weight, partially mutually overlapping the slices if required. This system is currently constituted by a belt having two speeds, one for the partial overlap of the slices during the cutting process and one for the removal of the formed group.

According to conventional methods, the groups of slices can be produced continuously, i.e., without temporarily suspending the cutting of the slices, or with cutting pauses between one group and the next. Both methods have considerable drawbacks. In the first case, the length of the belt is fixed and proportional to the dimension (length) of the slice portion, which therefore cannot be changed except by replacing said belt. In the

second case, the length of the portions can be changed, but significant cutting hold downtimes are introduced which reduce the efficiency and yield of the machine.

Another important object of the present invention is to eliminate these drawbacks by improving the portion-making system so as to produce without cutting pauses but having, at the same time, extreme flexibility in the composition of the groups or stacks of slices.

Substantially, according to the invention the slicing process is optimized by fitting the machine with two independent motors, respectively for performing the pass and for performing the cut, one motor being connected to the flywheel support with a single transmission, the other motor being connected by means of a double transmission to an idler pulley, with overlapping portions, which is rotatably mounted on the shaft of the flywheel, and from said idler pulley to the shaft of the cutting blade. The two motors are powered individually and their speeds can be changed independently by means of respective control microprocessors that are interconnected in a master (flywheel) and slave (blade) relationship.

According to another important characteristic, the machine according to the invention is provided with improved interleaving means, which comprise two sheet insertion guides that protrude into the slice release region to support individual sheets at the falling path of said slices. In this manner, each slice, by falling, engages the underlying sheet, entraining it into contact with the last slice of the stack being formed.

The guides are capable of assuming, in step with the falling rate of the slices, a closer or closed position that allows to support the sheet and a spaced or open position that releases said sheet, allowing the falling slice to entrain it.

According to another important characteristic of the improved machine according to the present invention, the portion-making system is composed of two belts that are arranged in succession one after the other. The first belt, which acts as a true portion-making device, receives and staggers the slices. The second belt performs two separate functions, namely that of being an extension of the first belt, when said first belt is saturated, and that of removing the formed group of slices while the first belt resumes its portion-making function.

The two belts are controlled by respective microprocessors that are separate but interconnected by an appropriate logic unit.

The characteristics, purposes, and advantages of the improved machine according to the present invention will become apparent from the following detailed description and with reference to the accompanying drawings, given by way of non-limitative example, wherein:

figure 1 is a schematic lateral elevation view of an improved industrial slicer according to the present invention;

figure 2 is an enlarged-scale schematic sectional view, taken along the plane II-II of figure 1;

figure 3 is a sectional view, taken along the multiple planes III-III of figure 2;

figure 4 is an enlarged-scale schematic sectional view, taken along the plane IV-IV of figure 1;

figure 5 is a sectional view, taken along the plane V-V of figure 4;

figure 6 is a schematic view of the portion-making device in the initial step for forming the group of slices;

figure 6a is a diagram for portion-making by overlapping the slices;

figures 6b and 6c are schematic views, similar to figure 6, of further steps of the operation of the portion-making device.

In the drawings, the reference numeral 10 generally designates the slicer, which comprises a slice cutting section 11 and a section 12 for collecting and packaging the cut slices. The section 11 comprises a cabinet 13 and an inclined plate 14 for supporting the products to be sliced (not shown), which is mounted on pivots 14a that allow to vary the inclination of said plate in relation to the cabinet 13. Conventional means, not shown, are associated with the plate 14 and comprise a carriage for retaining the product to be sliced, which advances in steps the length whereof is equal to the preset thickness of the slices. At the pivoting regions, the plate 14 supports the cutting unit, generally designated by the reference numeral 15.

The section 12 for collecting the slices produced by the cutting unit 15 comprises a portion-making system 16-17, downstream of which there are provided a balance belt 17' and interleaving means, generally designated by the reference numeral 18, which are adapted to insert separator sheets between the slices of each stacking group.

The cutting unit 15 (figures 2 and 3) comprises a circular blade 19 that rotates about its own axis "a" with an angular velocity Ωt, known as cutting speed. The blade 19 is supported eccentrically by a flywheel support 20 by means of a pivot 21 that is mounted so as to be freely rotatable, with the interposition of bearings 22, on said flywheel support 20. In turn, said flywheel support is mounted so as to be freely rotatable, with the interposition of bearings 23, on a fixed pivot 24 and rotates, about the axis "b" of the pivot, with an angular velocity Ωp of its own, known as pass speed.

Accordingly, the blade orbits around the axis "b" of the pivot 24, performing in a cyclic manner a cutting pass every time the flywheel support 20 turns through 360°.

According to the present invention, the flywheel support 20 and the blade 19 are driven by respective independent pass and cutting motors 25-26 that are supported by the housing 27 of the cutting unit 15 and are individually powered and adjustable. More specifically, the motor 25 is connected to the flywheel 20 with

a single transmission and the motor 26 is connected to the blade 29 with a double transmission that allows the flywheel to rotate independently of the blade and vice versa.

The single transmission interposed between the motor 25 and the flywheel 20 comprises a toothed belt 28 that meshes with corresponding toothed pulleys 29-29' that are rigidly coupled to the motor shaft and to a hub 20' of the flywheel 20, respectively. The double transmission interposed between the motor 26 and the blade 19 comprises two toothed belts 30-31 and an idler pulley 32 with overlapping portions 32'-32", which is mounted so as to be freely rotatable, with the interposition of bearings 33, on the fixed pivot 24. The belt 30 transmits motion from a pulley 34 of the motor 26 to the first portion 32' of the idler pulley 32, and the belt 31 transmits the motion of the second section 32" of the idler pulley to a pulley 35 that is keyed to the pivot 21 of the blade 19. The overall transmission ratio of said double transmission can be chosen within a wide range of values and is not limitative for the present invention; in the illustrated example it is chosen slightly lower than one.

It is easily understood that with the described construction, the cutting speed Ωt and the pass speed Ωp can be changed individually by acting on the respective motors 25-26, for example by means of an electronic control that allows to program various ratios between said speeds, which are chosen in relation to the characteristics and temperature of the product, to the thickness of the slices to be produced, and/or to other parameters for optimizing the cutting process.

With reference now to figures 4 and 5, another improvement of the machine, relating to the interleaving means 18 for inserting separator sheets between the slices of each group being formed, is now described.

According to the present invention, said means include two fork-like guides 40 that protrude into the slice release regions to support, at the falling path of said slices, individual separator sheets FS that are cut by means of a blade (not shown) from a continuous ribbon N that is wound on a reel B (figure 1). The guides 40 can assume, in step with the falling rate of the slices, a nearer closed position, shown in solid lines in figure 4, that allows to support the sheet FS, and a spaced open position, shown in dashed lines in said figure 4, which releases said sheet, allowing its entrainment on the pari of the falling slice; each sheet is thus inserted between one slice and the next of the group being formed.

For this purpose, each guide 40 is supported by a corresponding articulated quadrilateral 41 that comprises a fixed supporting base 42 and two arms 43-43' in which one end is articulated to the base 42 and the other end is articulated to the corresponding guide 40. The arm 43 of each pair is provided with an L-shaped wing 43a, to which the end of a linkage 44 is articulated, the other end of said linkage being articulated to a rocker 45. Said rocker has, at the articulation axis of the linkage, a tappet roller 46, with which a movement cam 47 cooperates; said cam is supported by a support 48 and is moved, in step with the flywheel support 20, by a transmission comprising a pulley 49 and a toothed belt 50. A return spring 51 acts on the rocker 45 to keep the roller 46 in active contact engagement with the cam 47.

With reference now to figures 6, 6a, 6b, and 6c, it is evident that the portion-making system is composed of two separate conveyor belts 16-17 having respective fixed and preset lengths L_1-L_2.

Each belt is driven by a corresponding motor (not shown) that is controlled by a respective microprocessor (not shown), and the two microprocessors are interconnected by an appropriate logic unit, as will become apparent hereinafter.

The first belt 16 acts as an actual portion-maker, receiving and staggering the slices FE that arrive from the cutting section 15 so that said slices partially overlap one another; the staggering percentage, i.e., the slice portion that is left free by the subsequent overlapping slice, is designated by L_S in the figure and the diameter of the slices is designated by L_P. The two values L_S and L_P and the number of slices, nf, that compose the group G of slices constitute the variable parameters used in the logic portion-making procedure.

The second belt 17 performs two separate functions, namely constituting an extension of the first belt 16 when said first belt becomes saturated, and removing the formed group of slices, transferring it to the belt-equipped balance 17', while the first belt 16 resumes its portion-making function. Both belts 16-17 have variable speeds. In particular, the belt 16 does not move when receiving the fall of each individual slice FE, thus improving its deposition and settling. Once deposition has occurred, the belt 16 moves forwards to reposition itself by an extent that is equal to the set staggering percentage L_S. This repositioning advancement is correlated to the rotation rate of the flywheel support 20 and ends just before the next slice FE' falls. For this purpose, the microprocessor that controls the motor of the flywheel support 20 is operatively connected to both of the microprocessors that control the motors of the belts 16-17 in a master-slave relationship.

The microprocessor associated with the belt 16 checks whether the saturation configuration of said belt has been reached by adding the diameter L_P of the slice to the staggering percentage L_S multiplied by the number of slices that have been deposited, less one, and comparing the result with the length L of said belt. The saturation time T_1 is also stored by the microprocessor for the purpose that will become apparent hereinafter.

By way of example and for the sake of better comprehension, a belt 16 that is 150 mm long is saturated by the overlapping of six slices FE having a diameter of 100 mm and a staggering percentage equal to 10 mm (figure 6a). Once saturation has occurred, if the number nf of slices programmed for the group being formed is greater than the number that saturates the belt 16, the control microprocessor of said belt sends a first interpo-

lation criterion to the microprocessor that controls the belt 17; by virtue of this criterion, this last belt is moved in steps that have a length L_S, perfectly in step with the belt 16, thus forming a true extension thereof. Once the number nf of slices required for the group being formed has been reached, both belts 16-17 move in step at such a speed as to cover a path, termed transfer path, that is equal to the length L_1 of the belt 16 in the time that corresponds to a full turn of the flywheel support 20, so that in this time the group of slices that has been formed is fully transferred onto the belt 17. This is achieved by means of a second interpolation criterion between the two belt control microprocessors, wherein the data item related to the path to be covered is changed, since the new data item is equal to L_1 instead of L_S. At the end of said transfer path, the belt 16 disengages from the synchronization with the belt 17 to accommodate the first slice of the next group and repeat the described portion-making cycle.

In turn, the belt 17, which bears the entire group of slices transferred thereon, disengages from synchronization with the flywheel support 20 and advances at a speed V_2 of its own, which can in any case be preset, to move the head of the group G of slices to the end of said belt, covering the distance T_2V_2 shown in figure 6b. From this point onward, the belt 17 is synchronized with the speed V_3 of the subsequent balance belt 17' (figure 6c) and maintains this speed for a time T_3, covering a path T_3V_3 that is equal to the total length of the group G and thus removing said group. The speeds V_2 and V_3 are chosen so that the sum of the times T_2 and T_3 required for completely removing the group G from the belt 17 is less than the saturation time T_1 of the belt 16.

Of course, without altering the concept of the invention, the details of execution and the embodiments may be altered extensively, with respect to what has been described and illustrated, by way of non-limitative example without thereby abandoning the scope of the invention.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Industrial slicer, particularly for food products, of the type comprising: a cutting unit with a rotating blade that is eccentrically supported by a flywheel support to move along an orbital pass path; interleaving means for inserting sheets between one slice and the next of the group of slices being formed; and portion-making means for the programmed formation of said groups of slices, characterized in that said cutting unit (15) comprises two independent motors (25-26), respectively a pass motor and a cutting motor, said motors being connected respectively to the flywheel support (20) with a single transmission (28-29-29') and to the rotating blade (19) with a double transmission (30-31-32-35) that allows the flywheel (20) to rotate independently of the rotation of the blade (19).

2. Slicer according to claim 1, characterized in that the pass and cutting motors (25-26) are powered independently and allow to program the cutting speed (Ωt) and the pass speed (Ωp) and their ratio within limits that are in any case wide.

3. Slicer according to claims 1 and 2, characterized in that said double transmission includes an idler pulley (32) which is mounted on the fixed pivot (24) of the flywheel support and is freely rotatable relative to said pivot (24) and said flywheel support (20).

4. Slicer according to claims 1 to 3, characterized in that said single transmission interposed between the pass motor (25) and the flywheel support (20) comprises a toothed belt (28) that meshes with two toothed pulleys (29-29') connected respectively to the shaft of said motor and to a hub (20') of the flywheel support.

5. Slicer according to claims 1 to 3, characterized in that said double transmission interposed between the cutting motor (26) and the rotating blade (19) includes two toothed belts (30-31), said belts meshing respectively with a toothed pulley, which is connected to the shaft of said motor and to a first portion (32') of the idler pulley (32), and with a second portion (32") of the idler pulley and a toothed pulley (35) that is keyed to the rotating pivot (21) of the rotating blade (19).

6. Slicer according to claim 5, characterized in that the overall transmission ratio of said double transmission is chosen smaller than one, greater than one, or equal to one.

7. Industrial slicer, particularly for food products, of the type comprising at least one cutting unit, interleaving means, and portion-making means, characterized in that the interleaving means (18) comprise two insertion guides (40) that protrude into the regions for the release of the slices from the cutting unit (15) to support individual sheets (FS) at the falling path of said slices, and in that each slice, in falling, affects the underlying sheet, entraining it into contact with the last slice of the group of slices being formed.

8. Slicer according to claim 7, characterized in that said guides (40) are subjected to a kinematic actuation system that allows them to assume, in step with the falling rate of the slices, a closed position

that allows to support the sheet (FS) and an open position that releases the sheet, allowing the falling slice to entrain it.

9. Slicer according to claims 7 and 8, characterized in that said kinematic actuation system comprises, for each guide (40), an articulated quadrilateral (42-43-43') actuated by a linkage (44) that is articulated to a rocker (45) contrasted by a spring (51), said rocker being provided with a tappet roller (46) that is operatively engaged by a movement cam (47); and in that the movement cam is moved in step with the flywheel support (20) by a toothed belt transmission (49-50).

10. Industrial slicer, particularly for food products, of the type comprising a cutting unit with a rotating blade that is supported eccentrically by a flywheel support, interleaving means, and portion-making means for the programmed formation of groups of slices, characterized in that said portion-making means are constituted by two belts (16-17) that are arranged one after the other, in which the first belt (16) receives and staggers the slices (FE), performing the function of actual portion-maker, and the second belt (17) performs the dual function of constituting an extension of the first belt (16) when it becomes saturated and of removing the formed group (G) of slices when the first belt (16) resumes its portion-making function.

11. Slicer according to claim 10, characterized in that each belt (16-17) is moved by a corresponding motor that is controlled by a respective microprocessor.

12. Slicer according to claims 10 and 11, characterized in that the first belt (16) does not move when it receives each individual slice (FE) arriving from the cutting unit and performs successive individual advancement movements for repositioning, the length whereof is equal to the staggering percentage (L_S) between one slice and the next.

13. Slicer according to claims 10 and 12, characterized in that said repositioning advancement (L_S) is correlated to the rotation rate of said flywheel support (20) and ends just before the next slice falls.

14. Slicer according to claims 10 to 13, characterized in that the control microprocessor of the first belt (16) is programmed to detect when the saturated condition of said belt (16) is reached and the related saturation time (T1) and to send, if the number of slices (nf) programmed for the group (G) being formed exceeds the number of slices present on said first belt, a first interpolation criterion to the microprocessor of the second belt (17) so that both belts (16-17) move simultaneously in steps the length whereof is equal to the staggering percentage (LS), so that the second belt (17) constitutes a true extension of the first belt (16), which allows to accommodate the entire group (G) of slices being formed.

15. Slicer according to claims 10 to 14, characterized in that the control microprocessor of the first belt (16) is furthermore programmed to send, when the programmed number (nf) of slices of the group is reached, a second interpolation criterion to the control microprocessor of the second belt (17), and in that by virtue of said second interpolation criterion both belts move in step, covering a transfer path that is equal to the length (L1) of the first belt (16) in order to fully transfer the group (G) of slices onto the second belt (17); said transfer path being covered in the time that corresponds to a full turn of said flywheel support (20).

16. Slicer according to claim 15, characterized in that at the end of said transfer path the first belt (16) disengages from the synchronization with the second belt (17) to accommodate the first slice of the next group and repeat the portion-making cycle.

17. Slicer according to claims 15 and 16, characterized in that at the end of said transfer path the second belt (17) disengages from the synchronization with said flywheel support (20) and advances with a speed (V2) of its own to move the group (G) of slices to the end of said belt in a preset time (T2), subsequently synchronizing itself with the speed (V3) of a balance belt (17') in order to remove onto said balance belt the entire group (G) of slices in a preset time (T3).

18. Slicer according to claim 17, characterized in that the sum of said preset times (T1+T2) required for completely removing the group (G) of slices from the second belt (17) is smaller than the time (T1) required for the saturation of the first belt (16).

Fig. 1

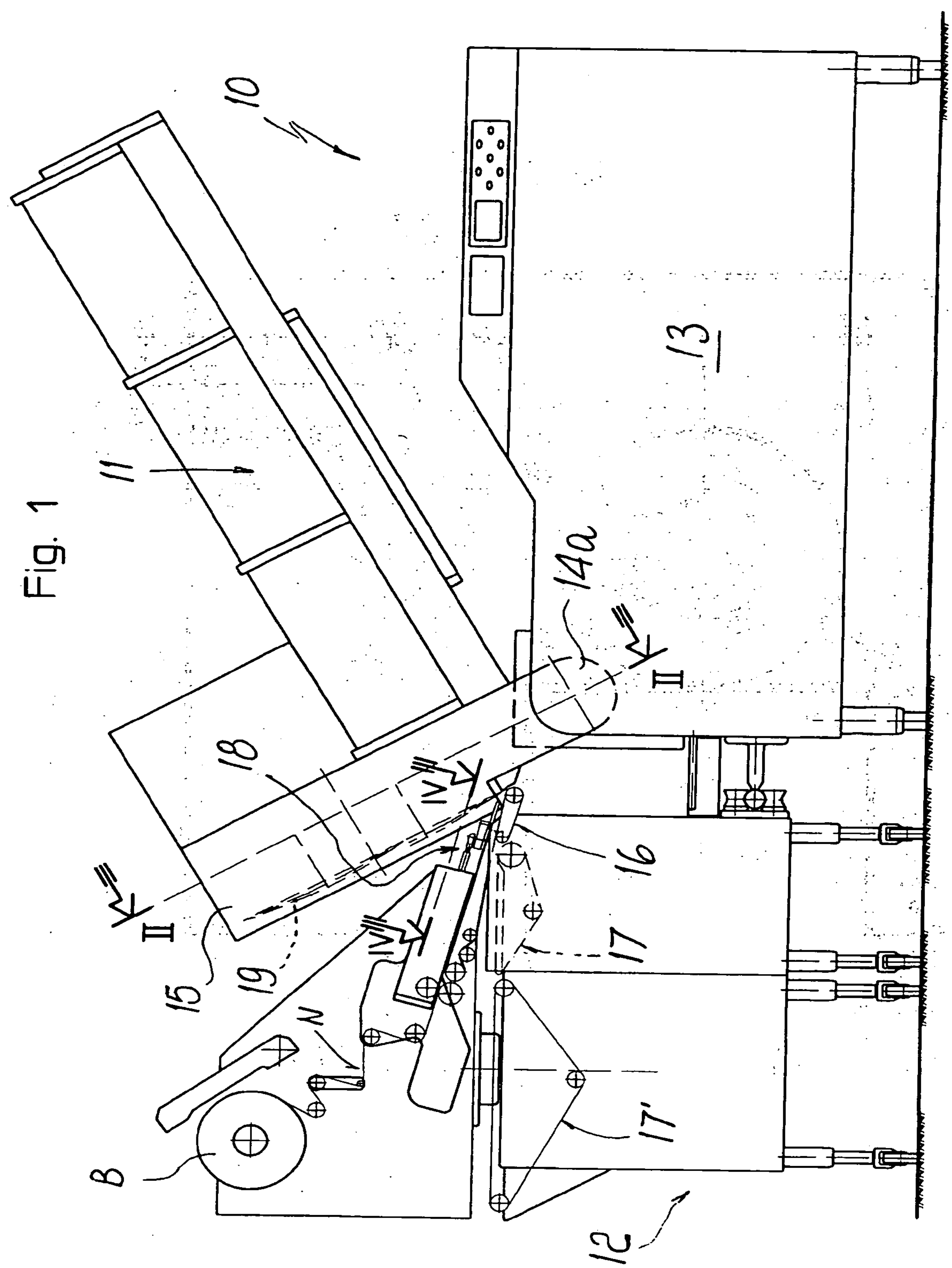


Fig. 2

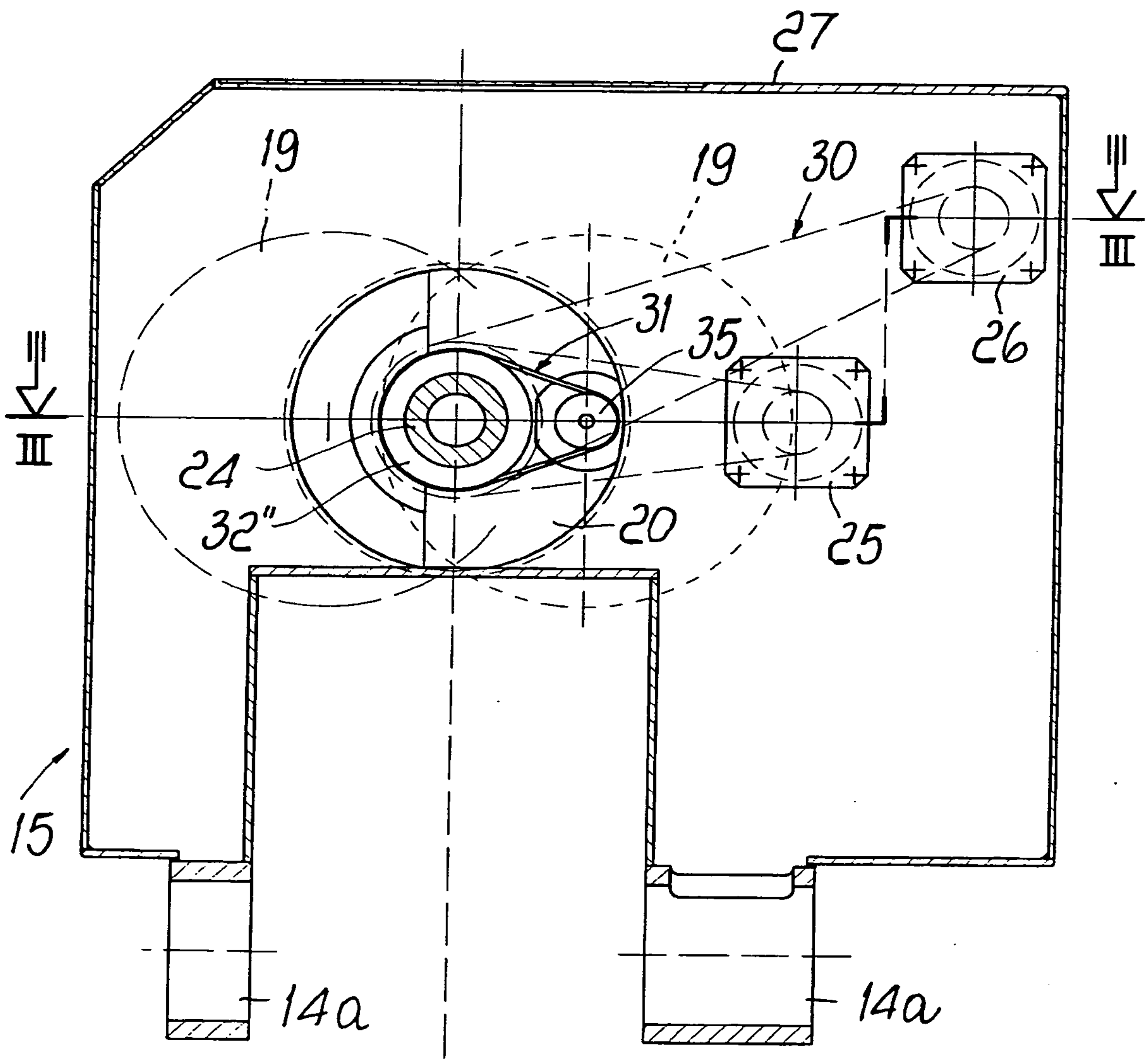
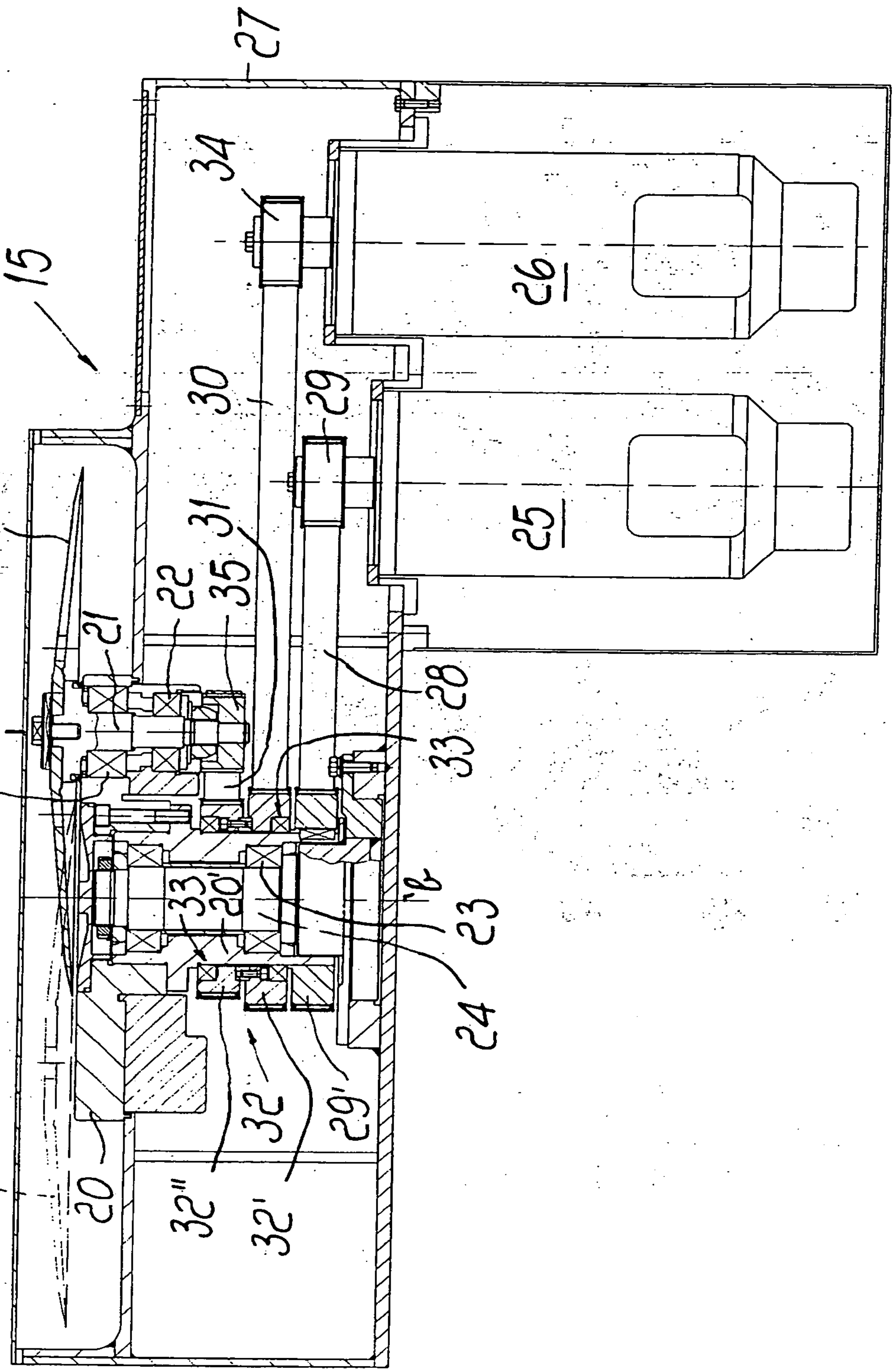


Fig. 3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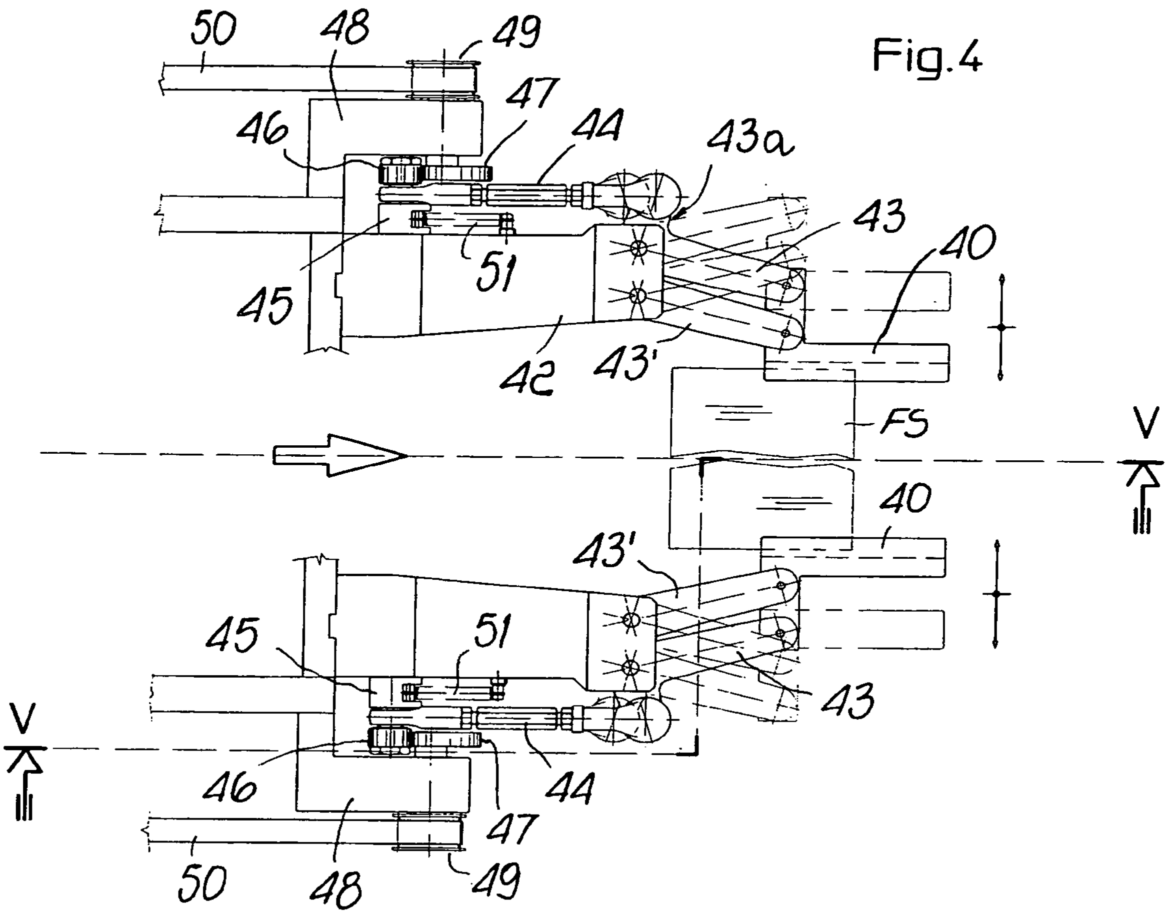
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Fig.4

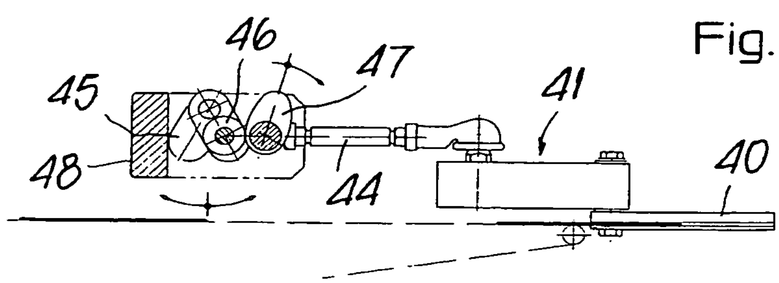
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Fig.5

Fig. 6

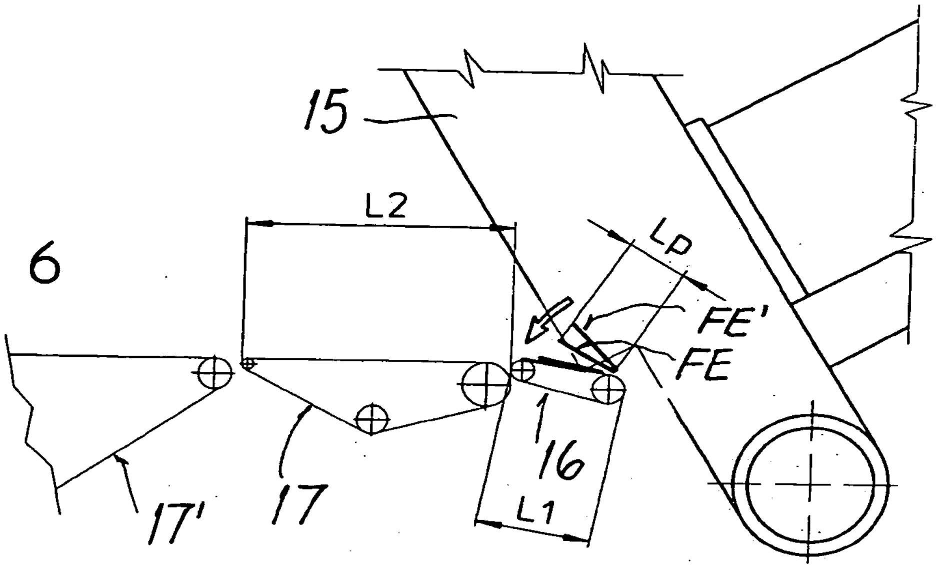


Fig. 6a

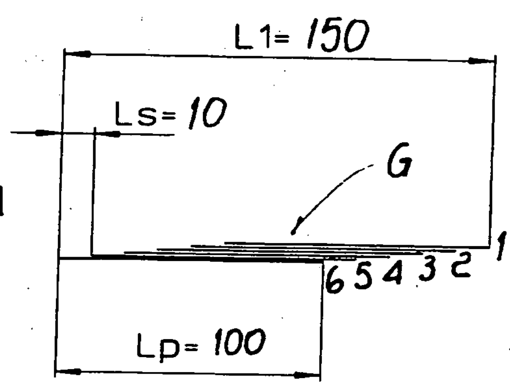


Fig. 6b

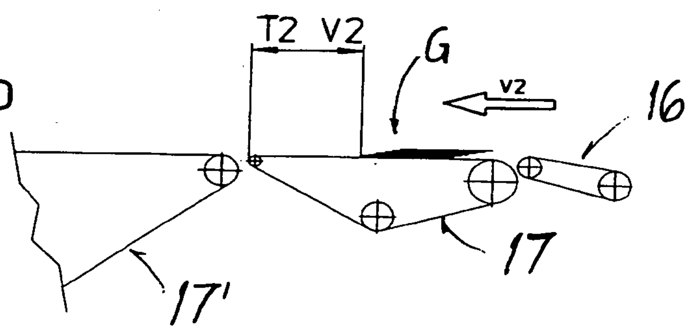
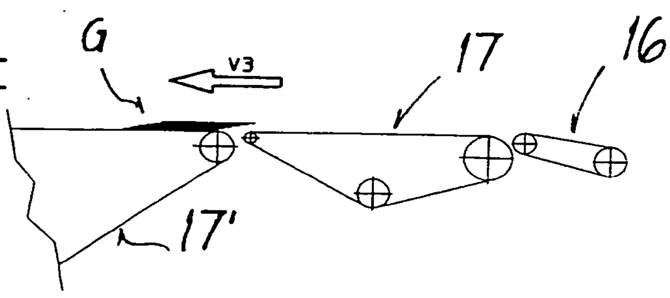


Fig. 6c



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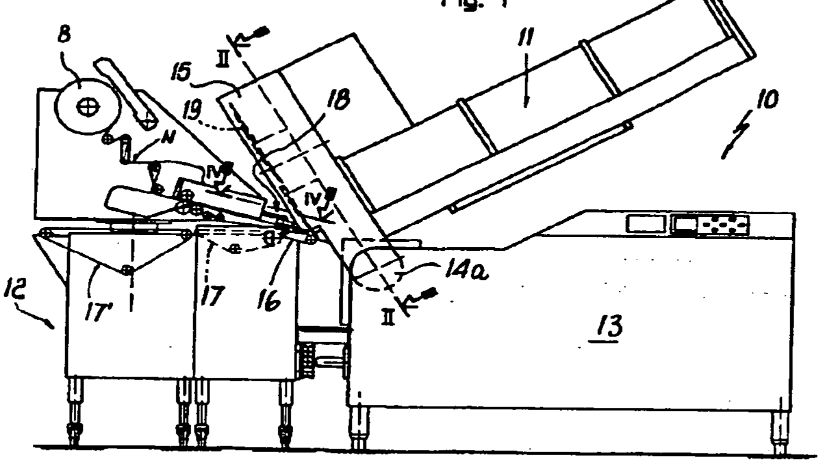
(54) **Improved industrial slicer, particularly for food products**

(57) The slicer comprises a cutting unit (15) with a rotating blade (19) that is eccentrically supported by a flywheel support, interleaving means (18) for inserting sheets between one slice and the next, and portion-making means (16-17) for the programmed formation of the groups of slices. The cutting unit (15) comprises two independent motors, respectively connected to the flywheel support with a single transmission and to the rotating blade (19) with a double transmission; the interleaving means (18) comprise two insertion guides that protrude into the slice release regions of the cutting unit (15) to support individual sheets at the falling path of the slices, and the portion-making means are constituted by two belts (16-17) arranged one after the other, the second belt (17) being actuated so as to constitute an extension of the first belt.

Fig. 1



EP 0 736 361 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 10 4880

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE 82 37 311 U (NATEC REICH , SUMMER GMBH & CO. KG) * the whole document * ---	1-6	B26D1/16 B26D7/27 B26D7/32
Y	US 3 842 698 A (FITCH ET AL.) * column 3, line 34 - column 5, line 4 * ---	1-4	
Y A	US 4 041 813 A (SPENCER) * column 5, line 59 - column 6, line 50; figures 1,9,12 * ---	1,4-6	
A	DE 20 32 801 A (JESSET & HENRY (FOOD MACHINERY LTD.) -----		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
B26D

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 October 1996	VAGLIENTI, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.

☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid,

namely claims:

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,
namely:

see sheet -B-

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respects of which search fees have been paid,

namely claims:

☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims,

namely claims: 1-6

European Patent Office

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

The subject matter can be grouped in 3 different objects, each defining an independent invention :

1.	Claims 1-6	:	Planetary motion drive for a slicing machine.
2.	Claims 7-9	:	Interleaving device for a slicing machine.
3.	Claims 10-18	:	Portion making means for a slicing machine.

Having regard to the state of the art as represented by DE-U-82 37 311, describing a slicer equipped with an eccentrically supported blade, interleaving means and portion making means, it would appear that there isn't any special common technical feature left which could constitute a link between the three independent claims 1,7 and 10.

The search report has been drawn up for the claims 1-6 (group 1).

It should be noted that if a closer analysis during a further search reveals that the common technical feature of the subject of claims 10-18 is obvious or belongs to prior art, further lack of unity can be objected.
